

Diagnosis, planning and treatment of opaque dental enamel spots: case report and 4 years follow-up

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Abstract: The demand for aesthetic dental treatments is increasing. The aim of this paper is to present a case report and discuss the treatment performed to solve the problem of color alteration in teeth with deep, opaque

and well defined spots. It can be concluded that tooth bleaching, followed by mechanical removal of the opaque areas and restoration with composite resin, by the stratified technique, was a conduct with immediate res-

oluteness for solving the complaints of the patient and longitudinally proven after 4 years follow-up. **Keywords:** Dental enamel hypoplasia. Esthetics, dental. Composite resins. Dental restoration, permanent.

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How to cite: Hoepfner MG, Tazima G, Salomão FM, Burey A, Melo PED. Diagnosis, planning and treatment of opaque dental enamel spots: case report and 4 years follow-up. J Clin Dent Res. 2016 Oct-Dec;13(4):79-87.

Submitted: October 14, 2015 - **Revised and accepted:** November 16, 2016.

DOI: <http://dx.doi.org/10.14436/2447-911x.13.4.79-87>

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» The authors report no commercial, proprietary or financial interest in the products or companies described in this article.

» Patients displayed in this article previously approved the use of their facial and intraoral photographs.

INTRODUCTION

Considering that the aesthetics values are subjective, the conditions presented by the smile have strong appeal in the initial interpersonal contacts.^{1,2} To meet a personal need and driven by the media, the number of patients seeking specialized dental care to solve problems related to the color, shape, size and positioning of the teeth in the dental arches is increasing.

The formation of dental enamel involves a sequence of organized and interrelated mechanisms. Hereditary disorders, systemic and local, during the organic matrix secretion phase may result in a partial or total quantitative problem of the dental enamel, characteristic of enamel hypoplasia;^{3,4} while the involvement of the maturation/mineralization of the organic matrix previously deposited, due to environmental factors, compromises the color and translucency of the enamel, denominated enamel opacity.^{3,5} Clinically, compromised enamel by diffuse opacity is represented by white patches without definition of delimitation. The demarcated opacity is characterized by well-defined white, yellowish or brown areas.^{6,7} The clinical alterations diagnosed and the affected area of the dental enamel depend on the intensity, extent and the moment of the aggression.

Due to the similarity of the clinical characteristics and because they do not occur in isolation, the differential diagnosis of these changes requires careful anamnesis. The proposed treatment depends on the intensity of the changes evidenced on the dental enamel surface, whether in relation to the contour, color, texture, gloss, presence of cavitated areas and sensitivity. Thus, it can vary between conservative procedures, such as topical application of fluoride or desensitizers;⁸ conservative invasive procedures that propose the removal of compromised dental

enamel, without clinically altering the superficial contour, such as enamel microabrasion;^{9,10,11} and non-conservative invasive procedures that propose the removal of compromised dental enamel and its replacement with restorative material, directly or indirectly.^{12,13,14,15}

Considering the results observed in the 4 year preservation, the present work has the objective of reporting and discussing the restorative treatment performed to solve the aesthetic problem of teeth with deep and well delimited opaque white spots, diagnosed as enamel hypoplasia.

CASE REPORT

A 26-year-old female patient sought treatment for aesthetic reasons, with the main complaint being the color of the teeth and the white patches present, with greater intensity, in the middle and incisal thirds of the teeth 11, 21 and 31.

After anamnesis, extra and intrabucal clinical examination, it was observed: 1) white, opaque, diffuse and also delimited spots on the upper and lower incisor, canines and premolars teeth, opacity characteristics of the enamel; 2) a slight alteration of the superficial texture in the cervical buccal third of the canine and upper premolar teeth, indicative of hypoplasia; 3) gingival inflammation, recession of the gingival tissue in the vestibular face of the lower central incisor teeth and exposure of the root surface to the buccal environment, however, without abrasion, caries or reports of sensitivity by the patient, and 4) right unilateral crossbite and absence of vertical trespass (Fig 1). The patient reported breathing through her mouth, dry mouth feeling and, consequently, licking her lips to keep them moist. With the assistance of a speech and language pathologist, we also observed lowered positioning of the tongue in resting position, flaccid tongue with dental marks on the lateral borders and distortion in the fricative phoneme /s/.



Figure 1: Initial clinical condition, frontal view in occlusion.

In order to evaluate the extent and opacity degree of the enamel spots and to assist in the treatment planning, the light emitting tip of a photo curing device based on a halogen lamp was placed on the palatal surface of the incisors (Fig 2).

In view of the clinical picture, it was proposed: 1^o) scaling and polishing of the root and crown, orientation and motivation regarding oral hygiene, with emphasis on dental brushing technique; 2^o) tooth whitening with 38% hydrogen peroxide, used in the in-office technique, and



Figure 2: Assessment of the degree of impairment of tooth enamel 21.

3^o) mechanical removal of opaque areas on teeth 11, 21 and 31, and restoration with composite resin.

After the basic periodontal therapy, two tooth whitening sessions were performed by the in-office technique, with a 38% hydrogen peroxide gel (Opalescence Boost PF, Ultradent Products Inc.), with an interval of one week between the sessions. According to the technique recommended by the manufacturer, teeth prophylaxis was first performed with paste obtained from the mixture of pumice and water, with the aid of a rubber cup (Viking, KG Sorensen, Ind. And Com. Ltda), at low-speed. Next, an intrabucal device was placed to retract lips,

tongue and expose dental arches (ArcFlex, FGM Dental Products). As a safety measure, the eyes of the operator, assistant and patient were protected with glasses (Uvex 140MM, USA). The marginal gingival tissue and the cervical region of the teeth were also protected with a photopolymerizable resin (OpalDam, Ultradent Products Inc.). The bleaching gel remained on the vestibular surface of the teeth for 30 minutes (Fig 3), uninterruptedly, when it was then removed with the aid of a disposable suction device. The teeth were then washed with a water jet, applied in the cervico-incisal direction, and the gingival protection was removed with a double exploratory probe number 5 (Duflex SS White).



Figure 3: 38% hydrogen peroxide bleaching gel application.

Fifteen days after the second bleaching session, the restorative stage began. Considering the extension of the areas to be restored, a nano-particulate restorative system was used, with resins composed of different degrees of opacity and translucency (Filtek Z350 XT, 3M ESPE). The colors were selected from the realization of provisional restorations (restorative test), prior to the mechanical preparation.

After anesthesia and isolation of the operative field with rubber dam, the opaque dental enamel area of tooth 21 was removed with the aid of a spherical diamond tip (FG 1013, KG Sorensen, Ind. & Com. Ltda), in high-speed, under

refrigeration with air and water spray. Subsequently, the cavity was moistened for evaluation of the optical quality of the remaining substrate (Fig 4).

After preparation, the enamel and dentin substrates were conditioned with 37% phosphoric acid (Condac, FGM Dental Products) for 30 and 15 seconds, respectively. The conditioner was removed with water jet (Fig 5A) and the area was air-jet dried. Then, the Adper Single Bond adhesive system (3M ESPE) (Fig 5B) was applied and photopolymerized with a halogen lamp unit (Ultralux, Dabi Atlante), with a power of 600mW/cm², for 10 seconds.



Figure 4: Mechanical removal of stain and hydration for clinical evaluation of the remaining substrate.

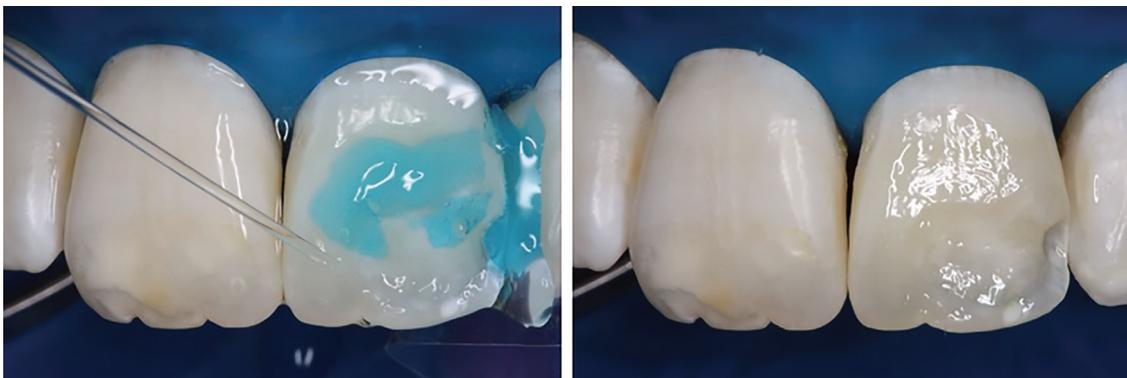


Figure 5: Removal of the conditioning agent and adhesive system applied.

With the aid of a metal spatula (Thompson number 6, Prisma), the selected composite resins were inserted by the stratified technique: 1st layer, A2 composite resin (Dentin) (Fig 6A); Second layer, over Dentin composite resin, composite resin in color A1 (Enamel) (Fig 6B); (CT) (Fig 6C). In order to finish and favor the final polishing, the translucent Transparent composite resin (CT) was used. Each increment of composite resin was photopolymerized for 40 seconds with the photo curing device already mentioned.

In the same session, the restoration with a diamond tip (3195 F, KG Sorensen, Ind. And Com. Ltda) was carried out in a high-speed and abrasive disc in low-speed (Sof -Lex Pop-On, 3M ESPE). In the following session, the polishing was carried out with impregnated silicone cups (Jiffy, Ultradent Products Inc.) and a flexible felt disc (Diamond Flex Felts, FGM) impregnated with aluminum oxide (Diamond R, FGM). Subsequently, teeth 11 and 31 were also

restored following the same clinical protocol (Fig 7).

After the restorative dental treatment to solve the main complaint reported by the patient at the first consultation, she was advised on the need for periodontal and orthodontic dental treatment. Because she reported breathing through her mouth, she was also advised of the need to be evaluated by other health professionals, such as otorhinolaryngologist, speech therapist and physiotherapist.

4 years following clinical preservation, the maintenance of the result obtained by the restorative treatment was verified. Similarly, restoration of periodontal health after frenectomy surgery followed by free gingival grafting to increase the keratinized gingiva area in the region of the lower central incisors (Figs 8A and B). However, the patient reported that she did not seek evaluation from other health professionals, as directed.



Figure 6: Insertion of composite resin increments: Dentin, Enamel and Translucent.



Figure 7: Immediate final clinical condition after finishing and polishing of the restorations, frontal view.



Figure 8: Final clinical condition, frontal view and after 4 years of preservation.

DISCUSSION

In the reported clinical case, the option for the direct restorative treatment with composite resin of teeth 11, 21 and 31 considered: 1) the need reported by the patient and 2) the degree of enamel impairment, both at the surface and in depth. The aesthetic result observed after clinical preservation of 4 years is indicative of the success of the proposed treatment.

Hypoplasia, commonly do not present functional dental problems, except for more severe cases. The aesthetic restorative treatment, when indicated, is to minimize the psychosocial effects that the clinical alterations in the enamel can cause in the patient.¹⁶

For planning the treatment to be performed, as relevant as diagnosing the etiology of the spots, it is necessary to assess the extent of the compromised tooth enamel, mainly in depth. For this purpose, the transillumination method was used with the aid of a halogen light curing device. Well delimited areas and little diffusion of light are suggestive of deep spotting in the tooth enamel. Bleaching with peroxides, microabrasion with acidic and abrasive products, and restorations with direct or indirect aesthetic materials are the options of treatment of enamel with spots.^{12,16,17}

The indication of microabrasion is restricted to the removal of superficial spots on the tooth enamel. For deeper stains, such as those diagnosed on teeth 11, 21 and 31, it is necessary to use a more invasive technique, with mechanical removal of the affected area and restoration with composite resin or ceramic laminate.¹¹ In a patient with inadequate lip sealing, microabrasion is also contraindicated. In this clinical condition, exposed to air, the teeth tend to dehydrate more easily and there is no formation of the moistened film that covers the enamel. Thus, areas with color changes become more

evident, which may characterize the failure of the procedure.^{17,18,11}

Tooth whitening with 38% hydrogen peroxide was performed to minimize the polychromatism of the teeth before restorations were performed. The option for the in-office technique considered the practicality of the technique, the desired result and the fact that the patient is a mouth or mixed breather.

Restoration of tooth 21 was performed 15 days after the second bleaching session. The interval between sessions was necessary because: 1) the color diagnosed, immediately after bleaching, does not represent the actual color observed after the rehydration of the teeth. Clinically, this means that the color selection of cosmetic restorative material should wait for the color stabilization of the bleached teeth; 2) the presence of remaining free radicals (nascent oxygen) may compromise the longevity of adhesive restorations.^{19,20,21,22}

The preparation was restricted to the mechanical removal of the opaque spots. Considering the difference in light refraction and reflection in the dry and hydrated dental structure,^{23,24} the evaluation of the amount of worn tissue, in relation to the desired aesthetic result, was made after the cavity was wetted.

The choice of a composite nano-particulate resin with different degrees of translucency and opacity, used in the direct and stratified technique, allows restorations with excellent aesthetics and acceptable clinical longevity to be performed at a lower cost than indirect aesthetic procedures.^{16,25} Another favorable factor for the longevity of the treatment performed is the verification of the adhesive technique in the dental enamel.

In the restorative technique, the finishing and polishing of the restorations increase the smoothness and surface gloss of the composite resin, minimize the likelihood of retention of

plaque on the restorative material and, consequently, its degradation. In the same way, they contribute to the longitudinal maintenance of the aesthetic results achieved.^{26,27}

After the frenectomy procedure, the option for periodontal surgery of the free gingival graft was due to the low amount of donor tissue in the area adjacent to the recession.²⁸ The procedure, in addition to minimizing the likelihood of recurrence, optimized aesthetics and increased the range of keratinized gingiva.²⁹

All stages of the treatment: diagnosis, planning and clinical execution were essential for the restoration of aesthetics, social reintegration and health promotion of the patient. So

relevant is also the understanding that, as a health professional, the orientation and referral of the patient to professionals from other areas is an integral part of the daily routine of the dental surgeon.

CONCLUSION

From the clinical evaluation of the extent and depth, it is possible to select the most appropriate form for the treatment of the hypoplastic changes of the dental enamel. Regarding the planned, performed and reported treatment, we can conclude that, in addition to the immediate satisfactory resolution to the patient, it demonstrated longevity of the results after 4 years of proservation.

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